CLAIMS

1. Optimized ink jet printhead, for the emission of droplets of ink on a print medium, comprising a sublayer of silicon (30), a structural layer (38) on top of said sublayer of silicon (30), and a plurality of ejection chambers (42) and of feeding ducts (56, 50), each chamber (42) containing at least one resistor (39), said structural layer (38) being provided with a plurality of ejector nozzles (46) communicating with each of said chambers (42) and arranged facing each of said resistors (46), **characterized in that** each of said chambers (42) and each corresponding feeding duct (56) are delimited by a flat bottom wall (43) made from a protective layer (32, 34) of said resistors (39), and by an upper wall (44) made of a substantially concave surface, including each of said nozzles (46) and joined to said bottom wall along a continuous perimetral line (52), so that the processes of formation and development of an ejection bubble of said ink, generated thermally by each of said resistors (39), are promoted.

2. Ink jet printhead according to claim 1, **characterized in that** said protective layer (32, 34) is made of a first layer of tantalum (34), facing the inside of said chamber (42), and deposited on top of a second isolating layer (32) of silicon carbide and nitride, arranged in contact with said resistors (39).

3. Ink jet printhead according to claim 2, **characterized in that** said first layer of tantalum (34) constitutes said bottom wall (43) of said chamber (42) and of said ducts (56) connected to them, said layer of tantalum (34) extending substantially beyond said perimetral line (52).

4. Ink jet printhead according to any of the claims 1, or 2, or 3, **characterized in that** said concave upper wall (44) is joined uninterruptedly to said feeding duct (56), to said bottom wall (43) and to said nozzle (46).

5. Ink jet printhead according to any of the previous claims, **characterized in that** the inner shape of each of said chambers (42) and of each of said feeding ducts (56) represents the complementary impression, produced in a photosensitive structural layer (38), of a sacrificial layer (57), obtained from a controlled and non-contained growth of a metal, deposited starting from a layer of gold (36), on top of said layer of tantalum (34).

6. Ink jet printhead according to claim 5, **characterized in that** said structural layer (38) is made of an epoxy or polyamide type, negative photoresist, applied on said sacrificial layer, covering it completely.

7. Ink jet printhead according to any of the claims from 1 to 4, **characterized in that** the inner shape of each of said chambers (42), of each of said feeding ducts (56) and of each of said nozzles (46) represents the complementary impression, produced

in a photosensitive structural layer (38a), of a sacrificial layer (57) and respectively of a cast (74), obtained from a controlled and non-contained growth of a metal, deposited starting from a layer of gold (36), on top of said layer of tantalum (34).

8. Ink jet printhead according to claim 7, **characterized in that** said structural layer (38a) is made of a non-photosensitive epoxy or polyamide type, negative photoresist, applied on said sacrificial layer (57) and on said cast (74), covering them completely.

9. Ink jet printhead according to claim 5, or 6, **characterized in that** said sacrificial layer (57) and said layer of gold (36) are removed by means of an acid bath, to create said chambers (42) and said feeding ducts (56) connected to them.

10. Ink jet printhead according to any of the claims from 5 to 9, **characterized in that** said sacrificial layer (57) is made of electrolytic copper.

11. Ink jet printhead according to claim 10, **characterized in that** said sacrificial layer is made of nickel.

12. Manufacturing process of an ink jet printhead made on a wafer (27), divided into a plurality of die (20), each of which comprises a sublayer of crystalline silicon (30), a plurality of thermal actuating elements (39), arranged on said sublayer of crystalline silicon (30), a protective layer (34, 36), made of a layer (34) of tantalum, in turn covered by a layer (36) of gold, **characterized by the fact of** comprising the following steps:

a) chemically activating said layer of gold (36), to promote the start of a subsequent electrodeposition of a metal (57), using a galvanic bath;

b) performing an electrodeposition of said metal (57) on said layer (36) of gold to make a sacrificial layer (57), obtained from a controlled and non-contained growth, both parallel and perpendicular to said layer (36) of gold;

c) applying a photosensitive structural layer (38), entirely covering said sacrificial layer (57);

d) making a plurality of nozzles (46) through said structural layer (38), using a photoetching process;

e) removing said sacrificial layer (57), in a chemical etching, in the form of a highly acid bath, to produce a plurality of chambers (42) for expulsion of said ink and of feeding ducts (56) connected to said chambers, delimited internally by a flat bottom wall (43), made of said layers of tantalum (34) and of gold (36) and by a concave upper surface (44), joined uninterruptedly to said bottom wall (43), said upper surface (44) representing a complementary and true impression of said sacrificial layer (57).

13. Process according to claim 12, **characterized by the fact that** step a) is

preceded by the following step:

f) etching said layer (36) of gold to define a starting area of said electrodeposition, correlated to the final dimensions of said ejection chambers (42).

14. Process according to any of the claims 12, or 13, **characterized by the fact that** steps c) and d) are replaced by the following steps:

g) applying a layer of thick positive photoresist (68), in various passes alternated with intermediate pauses, on top of said sacrificial layer (57), to obtain improved planarization of the upper surface of said photoresist (68);

h) exposing and developing said thick positive photoresist, making holes (70) with an inward flaring;

i) performing a cleaning operation with the Asher method, to eliminate traces of photoresist residue inside said holes (70);

m) performing a microetching and activating an oxidized portion (72) of the surface of said sacrificial layer (57), in correspondence with said holes (70);

n) reactivating the electrochemical growth of electrolytic copper inside said holes (70), directly on said sacrificial layer (57), to build a cast (74) of said nozzles (70);

o) removing said layer of thick positive photoresist (68);

p) applying a structural layer of non-photosensitive epoxy or polyamide resin (75), entirely covering said sacrificial layer (57), including said cast (74);

q) performing planarization of an upper surface (76) of said non-photosensitive structural layer (75), uncovering an upper dome (74a) of said cast (74) of copper.

15. Process according to claim 14, **characterized by the fact that** said non-photosensitive structural layer (75) is produced with a thickness preferably between 25 and 60 μm.

16. Process according to claim 12, **characterized by the fact that** steps c) and d) are replaced by the following steps:

r) applying a non-photosensitive structural layer (38a) covering the outer surface (58) of said sacrificial layer (57); said non-photosensitive layer 38a having a thickness preferably between 10 and 60 μm and being made of a negative, epoxy or polyamide type resin;

s) making a plurality of nozzles (46) through said structural layer (38a), using the excimer laser technology.

17. Optimized ink jet printhead and relative manufacturing process, substantially as described, with reference to the figures in the accompanying drawings.